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## Appendix B

# *Reducing Mortality in Children under Five: A Continuing Priority*

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In recent years, several international agencies have given highest priority to supporting programs for child survival and development in developing countries. This emphasis is justified and should continue at least until the year 2000. Child mortality is still the world's largest public health problem in numbers of individuals dying and years of life lost. The development of children determines the quality of future populations. Another reason children deserve priority is because child health interventions tend to be the most cost-effective health area activities in all parts of the world. In this appendix we will focus on selected issues relevant to the implementation of practical programs.

Some specific justifications for maintaining priority attention on the problems of children are the following:

- Children under five years of age make up about 15 percent of the population in most developing countries, and women in the reproductive age group make up about 20 percent. In poor countries, young children have higher mortality rates than any other age group—30 to 40 percent. Morbidity and malnutrition are also high. Children in unhygienic environments have to cope with the synergistic problems of numerous infections, to which they have to develop immunity at the same time that they are adapting nutritionally to rapid growth on limited diets. The United Nations Children's Fund (UNICEF) annual State of the World's Children reports have clearly demonstrated the many dimensions of the massive need. Estimates and projections of mortality in the present collection provide detailed information on the relative importance of the principal diseases. It is worth noting here that the World Health Organization (WHO) in conjunction with UNICEF has assigned highest priority to immunizable diseases, the pneumonia-diarrhea complex, malnutrition, perinatal problems, and conditions associated with maternal health.
- Both nationally and internationally no appeal for funds and support can match the donor generosity stimulated by children in need. The pathos of a simple picture of a suffering child stirs an eagerness to help. Individual responsive-

ness to the basic needs of children is greatly magnified by group response to effective messages in the public media. Communities seem more willing to correct social problems when children are involved than to do so for adults. Political leaders know their image among constituents can be improved by showing concern for the needs of children. In the past ten years, UNICEF's Child Survival and Development Revolution (CSDR) has stimulated unprecedented levels of international support, public awareness, and concern.

- In more rapidly developing countries attention is shifting from straightforward concern about child survival to child development. This includes efforts not only to improve health and nutrition but also to promote intellectual development and learning. Obviously, such child development activities must give intersectoral emphasis to education and strengthening the capacity and role of mothers. The goal is not only that all children should be healthy but that they should be educated.
- Child health interventions have a proven record demonstrating that their implementation is feasible in national programs. It has been repeatedly shown that a cluster of low-cost interventions can dramatically improve survival (UNICEF 1988). The methods can be implemented at home or in peripheral health facilities. They can often be applied best through community participation, and they have greatest long-term sustainability when they become incorporated into local cultural patterns. Education about a definable, locally relevant group of child care practices can produce continuing change in health habits that strengthens a general sense of self-reliance.
- Because of national expectations that international support for CSDR will continue, developing countries have made long-term commitments. If international donors were to reduce support for child health and shift their attention to adult problems, a serious loss of credibility would occur as mortality increased. Many countries have already become skeptical of international donor support because of its "unreliability." Continuity should be maintained until the

promised potential has been fulfilled. For instance, very large amounts of international funds are making rapid improvements in child immunization levels. If these funds are reduced after the global targets are achieved, there is no way that costs can be covered by national budgets. It has been calculated that about half of the poor African and Asian countries about whom data were available will not be able to finance present types of immunization programs even using the most optimistic projections of economic growth up to the year 2000 (Rosenthal 1989). Any slackening of international funding will raise the dismaying prospect of future epidemics in unimmunized populations, a situation reminiscent of the collapse of malaria eradication efforts in the 1960s. Alternative and less expensive means of running immunization programs are available as a routine part of primary health care. Instead of expensive campaigns, it has been shown that periodic "pulse" activities are helpful in increasing coverage.

- A global ethic of concern for children seems to be developing. It is fragile, but long-term commitments should follow passage of the United Nations Convention on the Rights of the Child. Promoting equity and disparity reduction are difficult national and international goals, but these concepts are more likely to be implemented in programs for children than in most other activities. All children deserve everything that their society and international resources can provide, because children represent the future in every country of the world.
- Calculations of the cost-effectiveness of child health measures almost automatically look good in comparison with health care for adults. This is usually most apparent when calculations are based on years of life saved.

## Some Priority Interventions

Recent experience has demonstrated that the following interventions deserve priority consideration in practical programs.

### *Immunizations*

Rapid progress is being made in worldwide efforts to immunize children against the six diseases covered by WHO's Expanded Programme on Immunization (EPI): measles, poliomyelitis, diphtheria, tetanus, pertussis, and tuberculosis. The best prospects for sustainable control are in situations where good primary health care infrastructure has been built up. Immunizations as part of primary health care should continue to have high priority until herd immunity is acceptably high and immunization services can be integrated into continuing preventive services. As these services are stabilized, other types of immunizations can be added according to local priorities. For instance, as indicated in chapter 15 of this collection, frequent transmission of the hepatitis B virus to babies from mothers who are type B carriers and the availability of an effective hepatitis B vaccine make this immunization a high priority in

some Asian countries. It may be possible to break the cycle of transmission and prevent the long-term sequelae of liver cancer and cirrhosis.

### *Diarrheal Diseases*

The second priority intervention with which considerable progress has been made in the Child Survival and Development Revolution is in the use of oral rehydration therapy (ORT) for watery diarrhea. In the 1980s 4 million deaths of children from diarrhea were estimated to occur each year before current programs were implemented, and that number can probably be halved by the use of ORT. Dehydration can be prevented by early home treatment through the use of simple local adaptations of traditional preparations, particularly those that are cereal-based (Taylor and Greenough 1989). As with immunizations, the most effective ORT programs are where primary health care infrastructure provides backstopping and support. Packets of oral rehydration salts, intravenous fluids, antibiotics, and other appropriate treatment should be used by health facilities for severe cases of dysentery and chronic diarrhea. It is especially necessary to increase efforts to stop the massive overuse of ineffective medicines. A growing priority is recognition of the close linkage between diarrhea and malnutrition. Diarrhea is one of the most important causes of childhood malnutrition, and nutrient loss can be partially compensated for by appropriate feeding during and after illness.

Diarrhea programs are also beginning to pay increasing attention to the promotion of preventive strategies. The World Health Organization's Diarrhoeal Diseases Control Program has sponsored useful analyses comparing the potential effect of more than twenty interventions (Feachem 1986). Measles, which can be prevented by immunization, frequently causes diarrhea. When it becomes available, rotavirus immunization will probably be highly cost-effective. Promotion of breastfeeding during the first four to six months of life, improved personal and domestic hygiene through hand washing and cleanliness, and better preparation and preservation of food are practical and low-cost methods of diarrheal disease prevention. Sanitary disposal of excreta and improving the availability of water are of continuing importance. Particular attention needs to be paid to the safe disposal of stools of children because they have the highest infection rates.

### *Acute Respiratory Infections*

Ranking with diarrhea in importance as a cause of death of children are pneumonia and other infections of the lower respiratory tract. Although little has been done yet in large-scale application of new methods of control, it is possible now to affirm with some assurance that approximately half of the 4 million deaths of children from acute respiratory infection (ARI) each year can be prevented with available methods of case management. Immunizations will prevent some of these deaths. In addition to the vaccines for measles and pertussis, new pneumococcus and hemophilus vaccines will probably

become available in a few years, but they may not be affordable in public programs for some time. Priority attention to the implementation of national programs for improved case management of lower respiratory tract infections in children is overdue (Gadomski 1990). Methods have been developed to train village health workers to make early diagnosis of pneumonia in children with cough by counting respirations and observing difficult breathing. Antibiotic treatment can then be started promptly by the health worker using a simple protocol. As with diarrheal diseases, this strategy requires an effective primary health care infrastructure to provide technical backstopping and professional support. A significant effort is needed to stop the overuse of antibiotics for upper respiratory tract infections. Priorities for prevention have not yet been adequately defined. Improved maternal nutrition will increase resistance in babies of low birth weight who have extremely high neonatal pneumonia mortality rates. The severity of respiratory infections in children seems to be influenced particularly by parents who smoke and by smoke pollution in homes and urban areas. General factors such as crowding and poor housing also seem to be important in transmission. More evidence is needed on practices such as swaddling, which is common in some countries (for example, China and Turkey) and may interfere with respiratory function in newborn babies.

### **Malaria**

Globally, malaria control has long been given high priority because malaria is an important killer of children and a cause of chronic disability and debility at all ages. Despite the collapse of the worldwide program of malaria eradication, control of malaria is one of the great success stories of international health. The massive reduction in mortality and prevalence in Asia and the Americas has saved millions of lives, although control has proved difficult in Africa and parts of Southeast Asia, where resistant strains of mosquitoes and parasites continue to spread. Much of the improvement has resulted from general environmental and socioeconomic change rather than specific health interventions. Malaria remains one of the greatest challenges both for the development of technology and for a delivery system (Breman and Campbell 1988).

### **Protein-Energy Malnutrition**

The high prevalence of protein-energy malnutrition is indicated by the UNICEF estimate that 29 percent (165 million) of the world's children are malnourished according to standard weight-for-age criteria. Of these, 98 million children are in South Asia. The prevalence of maternal malnutrition is most evident in the high proportion of babies with low birth weight. It is estimated that about 16 percent of all babies born each year worldwide, or 20 million, weigh less than 2,500 grams at birth. Control of protein-energy malnutrition continues to deserve high priority because of its effect on child development and because of synergistic two-way interactions with infec-

tions. In many situations it has become evident that simply providing food is not sufficient to reduce malnutrition and that interventions to control infections are also needed. Most studies have focused on single nutritional interventions. Food availability, food affordability, and food use in the family are all key issues that need to be addressed. It is necessary now to develop understanding of how to integrate services adapted to causal patterns in specific situations.

### **Maternal and Perinatal Health Problems**

The fact that 99 percent of pregnancy-related deaths in the world occur in developing countries is clear evidence that many of them could be prevented (World Bank 1987). For both mothers and children, pregnancy and delivery are periods of considerable risk due to the following types of problems: hemorrhage, sepsis, eclampsia, obstructed labor, and complications of abortion. Perinatal mortality among the poor is largely determined by delivery care and the maturity of the fetus, which is indicated best by the birth weight. It is estimated that 2.5 million deaths occur each year from perinatal causes; the long-term developmental defects from conditions such as hypoxia during labor and birth trauma are more difficult to estimate (WHO/UNICEF 1986). Control efforts are concentrated mainly on general preventive measures and improving case management through the use of high-risk monitoring (Backett, Davies, and Petros-Barzovian 1984). Preventive measures are focused mostly on improving maternal health, particular emphasis being given to nutrition of the mother. Deficiencies in specific nutrients, such as iodine, iron, and folate, can seriously interfere with fetal development. Mothers who were themselves malnourished in childhood tend to have small pelvises and stature and are more likely to experience complications at the time of delivery. Sexually transmitted diseases and a variety of organisms in the genital tract can produce serious sequelae when they infect babies (Bang and others 1989).

Improved case management of pregnancy depends on a health care system which can identify high-risk conditions early and arrange for the pregnant mother to be referred for whatever special care is needed. This seems to work best when pregnancy care is part of primary health care and a high-risk surveillance system is adapted to the particular conditions and resources available locally (Lettenmaier and others 1988). Initial screening by personnel who are trusted by mothers should be readily available to foster the goal of achieving complete coverage of all pregnant women. The referral process, then, will depend on local networks of health personnel and facilities and also on communications and transport.

### **Breastfeeding**

Good lactation is the most natural of health interventions. Cessation of breastfeeding is, however, part of modernization trends in many areas of the world. Abundant evidence shows that in the poorest communities the effect of declining

breastfeeding rates is disastrous with regard to child mortality and nutrition. Its protective value is shown by the fact that breastfed babies are relatively healthy for the first six months of life and also by the good start they get for subsequent development. Breastfeeding is also the world's most ubiquitous method of family planning.

### **Birth Spacing**

Many studies have shown that family planning is an effective means of improving child health (IPPF 1988). It is usually associated with social and economic conditions in the home associated with being a "wanted child." International programs for family planning, unfortunately, have often been dissociated from health services. For eventual sustainability the two should be naturally linked, especially because this is the way mothers think about their problems. In a two-way interaction, family planning directly contributes to better child health, and child survival increases motivation to practice family planning.

### **Defining Local Priorities**

It has become increasingly evident that only a few interventions, such as immunizations and community environmental control measures, are sufficiently widespread around the world to justify their being given global priority. Once those programs have been introduced, the remaining priority problems will vary greatly, depending on local conditions and available resources. Examples range from infections such as malaria, hemorrhagic dengue, and Japanese B encephalitis to localized prevalence of kwashiorkor and iodine deficiency.

The systematic setting of priorities in health care on the basis of cost-effectiveness criteria will almost automatically give greater emphasis to prevention than to curative care. This is especially true for the communicable diseases which contribute most to childhood mortality, morbidity, and developmental deficit.

Most decisions about priorities require balancing concerns about the technological effectiveness of specific procedures and the feasibility and cost of using them. A health problem that has high priority because of high rates of mortality and morbidity may be given low priority because no effective control measures are available. Our greatest limitations seem to be in community-based delivery systems and in the process of adapting procedures to local conditions.

Decisions about priorities concerning what will actually be done are always influenced more by administrative and political issues than by epidemiological information about diseases. The interventions focused on in this collection are selected mainly because of potential efficacy for particular diseases, but there is also a need for more general types of information. Even though it may be appropriate to start a priority-setting process by considering the cost-effectiveness of disease-specific interventions, it then becomes necessary to consider how those interventions can be integrated in a total health system and what other resources are available within local socioeconomic constraints.

Some people have criticized UNICEF in recent years because its child-survival strategy is said to be based on a "selective" disease-oriented analysis of priorities. The fact is, however, that UNICEF's promotion of the Child Survival and Development Revolution had its origin in the Alma Ata principles of getting complete coverage for equity in primary health care. To this was added focused efforts to accelerate action in the home and community (Taylor and Jolly 1988). An important distinction is that UNICEF's GOBI (growth monitoring, oral rehydration, breastfeeding, immunizations) priorities are interventions and not specific diseases. They were selected largely because they were simple and low cost, had high effectiveness, and were suitable for mass implementation because they used methods which stressed social mobilization and self-reliance. They resulted in high expectations among political leaders who understood that these programs would give them opportunities to be involved in activities which had potential for public recognition at low cost (UNICEF 1988). The expectations UNICEF created in persuading national leaders to support the Child Survival and Development Revolution are now coming due as the people expect to benefit from the significant improvements that were promised. Great effort is being expended in trying to meet deadlines for ambitious targets that were set on the basis of limited analysis. The overall effort will have benefits even if particular interventions do not avert the number of deaths that was originally projected. The point, however, is that without the ambitious targets, much less would have been achieved. In the 1990s there should be more emphasis on building sustainable infrastructures.

Practical programs for control of the main communicable diseases of children require a combination of research and application. A common assumption of research workers has been that all they need to do is to make new findings and technology available, and then implementation will follow spontaneously. This is not necessarily true, as experience with smallpox has shown. Even though an effective vaccine was available, much persuasion and field research had to be done for a very long period of time before countries were willing to make serious efforts to control the disease. The chapters in this collection that are concerned with the high-priority diseases of childhood show the complexity of determinants of effective control even with the simplest interventions. Mass programs have had some clear successes, but the limitations of looking just for simple solutions have also become evident. As initial successes have been achieved, greater effort is needed to identify means of promoting sustainability and cost-effectiveness adapted to the community level. This requires new methods for adapting implementation to the particular cultural, socioeconomic, and administrative traditions of local groups and service sectors in what has been called country-specific health research (Commission on Health Research for Development 1990).

### **Determinants of Successful Child Survival Programs**

The ultimate need is that all special child survival programs should help to build a primary health care infrastructure. If any

intervention or technology is introduced as part of a special program, it should eventually be integrated into the local infrastructure except in the rare instances in which eradication seems feasible. The long-standing confrontation between proponents of vertical and horizontal programs should be viewed from the perspective that a balance is needed (Taylor and Jolly 1988). Setting priorities implies giving focused emphasis for a period of time to particular activities. These will not have sustainability, however, unless they are built into continuing services based on community priorities.

To achieve sustainability it is essential from the beginning to have programs that are based on sociocultural appropriateness and sensitivity. Community relationships should be developed in ways that ensure acceptability, accessibility, administrative feasibility, and continuing financing.

Any international initiative should not impose outside priorities but be responsive to continuing dialogue between national and local expressions of effective demand. It is counterproductive to push ahead in global initiatives without adjusting to local perceptions of community priorities.

The most profound and long-term changes in child survival and development will occur as a result of behavioral changes applied in family patterns of child care. Simplified procedures should be established to introduce new home methods in daily routines such as hand washing, oral rehydration, or improving weaning methods. In order for these routines to be accepted as parental behavioral norms, there will need to be strong social support for individual families. For instance, the goal should be for every case of watery diarrhea to be managed by mothers with home-based simple fluids to prevent dehydration.

New strategies are needed to combine interventions into rationalized packages of services as part of primary health care. Such packages should have great cost-effectiveness because of shared costs for programs which have multiple benefits. Little has been done to define entry points at which one type of intervention can facilitate the introduction of other interventions. Problems in measurement methodology need to be resolved to develop means of calculating cost-effectiveness in cases in which input, output, and outcome variables overlap. Sorely needed is quantitative analysis of integrated services seen in the successful national experiences in China and Sri Lanka. It may mean that we should set up new multipurpose studies on integrated services (WHO 1986), which would likely have to be done in relatively small but representative populations exemplified in the district strategy advocated by WHO.

## Types of Child Survival Interventions

A simple categorization may contribute to one's understanding of how to focus activities. Three strategic models can help in deciding about how particular child survival interventions can be most effectively implemented.

- *Preventive interventions organized by public or government services (EPI, community water supplies, regulations to control epidemics).* Some interventions may be considered so important that public health authorities take the initiative to

enforce mass implementation using legal or centralized regulatory controls. To make these methods acceptable to the public, the evidence for effectiveness and safety must be so indisputable that the people accept the principle that social good should take precedence over individual choice. Social mobilization can be applied through community pressure to enlist the compliance of individuals and groups.

- *Case management interventions (ORT, ARI, monitoring of high-risk pregnancies and growth).* In a two-phase process, initiative is taken first by the health system in setting up screening or surveillance procedures to identify specific health problems early, or individuals and groups who are at high risk. The second phase requires an appropriate response by the individual and family to apply preventive or corrective interventions. A strong educational process is necessary to stimulate awareness and motivation to act. Equally important is clear definition of what support is necessary from health services and reliable logistics to make appropriate drugs, equipment, and supplies accessible and available. These responses can range from implementation of interventions that can be readily applied in the home to knowing when to go to a health facility. Examples include knowing the right amount of salt to add to dilute rice porridge for simple home-based ORT, having readily available co-trimoxazole for childhood pneumonia that has been diagnosed by trained community health workers according to the WHO protocol for ARI, having easy access to weighing scales for growth monitoring, and testing blood pressure as part of routine prenatal examination.

- *Primary prevention in the home.* Some of the most positive and lasting changes in promoting better health and nutrition result from basic behavioral changes in routine child care. These depend on family initiative and represent one of the ultimate goals in improving child survival and development. Examples include personal hygiene and home sanitation, preventing the exposure of children to home air pollution and passive smoking, diets for long-term healthy development, and appropriate stimulation for intellectual development of babies.

## Competing Concerns

Two competing concerns must be balanced. The first is the need in almost all programs to increase community participation through decentralization. This requires local setting of priorities and dialogue between community leaders and health system workers to ensure technical quality of services, logistics, training, and supervision while taking into account local desires and priorities. Community participation can be a strong force in promoting sustainability.

The second concern is to ensure equity by setting up arrangements so that services reach those in greatest need. By targeting high-risk groups for special attention, a program should be able to reach those who have the highest prevalence of disease. It is only through improving their health that a significant effect on morbidity and mortality can be achieved.

It is, however, especially hard to reach those in greatest need because they tend to be suspicious and poor and they live in places with difficult transport and communication. Their access to care is limited by their own time constraints and well-established social and economic barriers. They are typically bypassed because they do not know where or how to get care. Getting care is not only inconvenient; local arrangements and the arrogance of health workers often violate local cultural patterns.

The conflict between the above two concerns arises because of the ease with which local leaders can manipulate the process of community participation and priority setting. Local leaders responsible for community participation usually make sure that benefits go first to their family and friends. Outside involvement in priority setting may help to ensure equity in coverage. If health service systems set up standard measurement methods as part of community-based surveillance, it should be possible to determine who in the community is in greatest need. Then dialogue between community elite and responsible health workers can allocate resources on the basis of data about relative need. Having to meet clear coverage targets set by national programs requires health workers and local leaders to make sure that special services get to all, especially the population pockets which have the greatest need. Based on systematic monitoring of the priority diseases in an area, the selection of an appropriate mix of priority interventions should become a responsibility shared among the health service workers, the community participants, and representatives of other sectors.

### Networks for Health Services Development

As primary health care infrastructure develops, one of the most important skills to be incorporated in local capacity building is the ability in decentralized units to work with communities in setting local priorities. An effective means for developing this capacity is to organize a network of linkages between academic centers and local health services (WHO 1986). This gives institutions with capability in operations research and planning an opportunity to work out practical solutions for local health problems in experimental areas. Solutions that have been adapted to local conditions can then be generally implemented in a systematic extension process. This strategy has the potential of promoting both community participation and equitable distribution. Information systems with rapid feedback to local implementation are a critical component.

Few preventive programs can be completely standardized because they all need to be adapted to local circumstances.

Program development can be greatly facilitated by setting up a learning process to find the best way of organizing locally appropriate services. Problems which arise in day-to-day activities can be brought to the experimental area for study in the field. These field studies should progressively advance knowledge so that there is incremental learning of what works under local circumstances. Regional linkages between such experimental areas and field research teams can be coordinated in a national network to build capacity and to provide mutual support.

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